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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Jean-Marc M. Jot et al.

Patent No.: 7,231,054

Issue Date: June 12, 2007

Examiner: Kurr, Jason

Group Art Unit: 2615

Docket No: 2045.114US1

Title: METHOD AND APPARATUS FOR THREE-DIMENSIONAL AUDIO DISPLAY

Commissioner for Patents
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SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
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Signature

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of Correction

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Patent 7,231,054   **PATENT**

IN UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No.:	7,231,054	Docket No:	2045.114US1
Issue Date:	June 12, 2007	Patentee:	Jean-Marc M. Jot et al.
Customer No.:	21186	Confirmation No.:	3679
Title	METHOD AND APPARATUS FOR THREE-DIMENSIONAL AUDIO DISPLAY		

REQUEST FOR CERTIFICATE OF CORRECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
ATTN: CERTIFICATE OF CORRECTION BRANCH

It is requested that a Certificate of Correction be issued correcting printing errors appearing in the above-identified United States patent. Two copies of the text of the Certificate in the suggested form are enclosed.

Pursuant to 1.20(a), enclosed please find a check in the amount of $100.00.

Issuance of the Certificate of Correction would neither expand nor contract the scope of the claims as properly allowed, and re-examination is not required.

The Examiner is authorized to charge any additional fees or credit overpayment to Deposit Account No.19-0743.

Respectfully Submitted

08/23/2007 HVUONG1 00000003 7231054
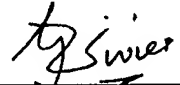01 FC:1811   100.00 OP

JEAN-MARC M. JOT ET AL.

By their Representatives,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A
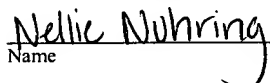P.O. Box 2938
Minneapolis, MN 55402
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Date : ___08.17.2007___   By: /_____/   : 2007,
                                     Garth Vivier
                                     Reg. No: 57,313
                                     GV:raq

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO   : 7,231,054   Page (1) of 5

DATED   : June 12, 2007

INVENTOR(S)   : Jot et al.

It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On sheet 11 of 13, in Fig. 9, delete "louspeaker" and insert - - loudspeaker - -, therefor.

On sheet 12 of 13, in Fig. 10, delete "directionnal" and insert - - directional - -, therefor.

On Sheet 13 of 13, in Fig. 11, delete "directionnal" and insert - - directional - -, therefor.

In column 1, lines 29–63, delete "An alternative approach, described in [Gerzon85], consists of producing a ʻB-Formatʼ multi-channel signal and reproducing this signal over loudspeakers via an ʻAmbisonicʼ decoder, as illustrated in FIG. 2. Instead of discrete panning functions, the B Format uses real-valued spherical harmonics. The zero-order spherical harmonic function is named W, while the three first-order harmonics are denoted X, Y, and Z. These functions are defined as follows:
$W(\sigma,\Phi)=1$
$X(\sigma,\Phi)=\cos(\Phi)\cos(\sigma)$
$Y(\sigma,\Phi)=\cos(\Phi)\sin(\sigma)$
$Z(\sigma,\Phi)=\sin(\Phi)$
where σ and Φ denote respectively the azimuth and elevation angles of the sound source with respect to the listener, expressed in radians. An advantage of this technique over the discrete panning method is that B Format encoding does not require knowledge of the loudspeaker layout, which is taken into account in the design of the decoder. A second advantage is that a real-world B-Format recording can be produced with practical microphone technology, known as the ʻSoundfield Microphoneʼ [Farrah79]. As illustrated in FIG. 2, this allows for combining microphone-encoded sounds with electronically encoded sounds to produce a single B-format recording. First-order Ambisonic decoders do not reconstruct the acoustic pressure information at the ears of the listener except at low frequencies (below about 700 Hz). As described e.g. in [Bamford95], the frequency range can be extended by increasing the order of spherical harmonics, but only at the expense of a higher number of encoding channels and loudspeakers." and insert the same on Col. 1, Line 30, below "mixing stage." as a new paragraph.

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PATENT NO   : 7,231,054   Page (2) of 5

DATED   : June 12, 2007

INVENTOR(S)   : Jot et al.

It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 3, line 26, after "listener" insert - - , - -.

In column 4, line 9, after "which" insert - - : - -.

In column 4, line 22 (Approx.), after "playback" insert - - . - -.

In column 4, line 32 (Approx.), delete "Discrete" and insert - - discrete - -, therefor.

In column 4, line 38 (Approx.), after "playback" insert - - . - -.

In column 4, line 54 (Approx.), after "playback over" delete "over". (Second occurrence)

In column 5, line 23 (Approx.), delete "$L(\sigma_p, \phi_p, f) = T_L(\sigma_p, \phi_p, f) L(\sigma_p, \phi_p, f),$" and insert - - $L(\sigma_p, \varphi_p, f) = T_L(\sigma_p, \varphi_p, f) \underline{L}(\sigma_p, \varphi_p, f)$, - -, therefor.

In column 7, line 10, delete "$H(f) = \exp(j\phi(f)) H_{min}(f)$" and insert - - $H(f) = \exp(j \psi(f)) H_{min}(f)$ - -, therefor.

In column 7, line 12 (Approx.), delete "$\phi(f),$" and insert - - $\psi(f)$, - -, therefor.

In column 7, line 14 (Approx.), delete "$\phi(f),$" and insert - - $\psi(f)$, - -, therefor.

In column 7, line 17 (Approx.), delete "ϕ_R" and insert - - ψ_R - -, therefor.

In column 7, line 17 (Approx.), delete "ϕ_L" and insert - - ψ_L - -, therefor.

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PATENT NO   : 7,231,054   Page (3) of 5

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It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 7, lines 20–23 (Approx.), delete "The interaural time delay difference, $ITD(\sigma_p, \Phi_p)$, can be defined, for each direction (σ_p, Φ_p), by a linear approximation of the interaural excess-phase difference:
$\Phi_R(\sigma,\phi,f)-\Phi_L(\sigma,\phi,f)\approx 2\pi f ITD(\sigma,\phi)$" and insert the same on Col. 7, Line 21 (Approx.), below "(σ_p, Φ_p, f) -" as a new paragraph.

In column 7, line 23 (Approx.), delete "$\Phi_R(\sigma,\phi,f)-\Phi_L(\sigma,\phi,f)\approx 2\pi f ITD(\sigma,\phi)$" and insert - - $\psi_R(\theta, \varphi, f) - \psi_L(\theta, \varphi, f) \cong 2\pi f ITD(\theta, \varphi)$ - -, therefor.

In column 7, line 39 (Approx.), delete "$ITD(\sigma,\phi)$ $2r/c$ $\cos(\phi)\sin(\sigma)$" and insert - - $ITD(\theta, \varphi) = 2r/c \cos(\varphi) \sin(\theta)$ - -, therefor.

In column 7, line 57 (Approx.), delete "$\Phi_R(\sigma, \phi, f)-\Phi_L(\sigma, \phi, f)$" and insert - - $\psi_R(\theta, \varphi, f) - \psi_L(\theta, \varphi, f)$ - -, therefor.

In column 7, line 58 (Approx.), delete "$\Phi(\sigma, \phi, f)$" and insert - - $\psi(\theta, \varphi, f)$ - -, therefor.

In column 7, line 59 (Approx.), delete "$\Phi_R(\sigma,\phi,f)-\Phi_L(\sigma,\phi,f)\approx\Phi(\sigma,\phi,f)$" and insert - - $\psi_R(\theta, \varphi, f) - \psi_L(\theta, \varphi, f) \cong \psi(\theta, \varphi, f)$ - -, therefor.

In column 8, line 2 (Approx.), delete "$\Phi_R(f)-\Phi_L(f)=\Phi_R(f)-\Phi_L(f)-\Phi(\sigma,\phi,f)$" and insert - - $\varphi_R(f) - \varphi_L(f) = \psi_R(f) - \psi_L(f) - \psi(\theta, \varphi, f)$ - -, therefor.

In column 8, line 5 (Approx.), delete "$\sigma_p, f)$ and $R(\sigma_p, \sigma_p, f)$" and insert - - $\varphi_p, f)$ and $\underline{R}(\theta_p, \varphi_p, f)$ - -, therefor.
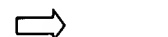
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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO   : 7,231,054   Page (4) of 5

DATED   : June 12, 2007

INVENTOR(S)   : Jot et al.

It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 8, line 30 (Approx.), after "recording" insert - - . - -.

In column 9, line 55 (Approx.), delete "ortogonal," and insert - - orthogonal, - -, therefor.

In column 9, line 64 (Approx.), delete " $<g_i,g_k>=1/(4\pi)\int\sigma\int\sigma g_i(\sigma,\phi)g_k(\sigma,\phi)\cos(\phi)d\sigma d\phi$ " and insert - - $<g_i,g_k>=1/(4\pi)\int_\theta\int_\varphi g_i(\theta,\varphi)g_k(\theta,\varphi)\cos(\varphi)d\theta\,d\varphi$ - -, therefor.

In column 12, line 21, delete " $g_i(\sigma,\phi)$ " and insert - - $g_i(\theta,\varphi)$ - -, therefor.

In column 12, line 25, delete " σ_i,ϕ_i " and insert - - θ_i,φ_i - -, therefor.

In column 12, lines 25–26, delete " σ_i,ϕ_i " and insert - - θ_j,φ_j - -, therefor.

In column 12, line 40, delete " $\underline{L}_{iij}$ " and insert - - $L_{i/j}$ - -, therefor.

In column 12, line 41, delete " $L_{iij}=L(\sigma_i,\phi_i,f)/L(\sigma_j,\phi_j,f)$ " and insert - - $L_{i/j}=L(\theta_i,\varphi_i,f)/L(\theta_j,\varphi_j,f)$ - -, therefor.

In column 12, line 42 (Approx.), delete " L_{iij} " and insert - - $L_{i/j}$ - -, therefor.

In column 12, line 46 (Approx.), delete " $L_{iij}=\exp(2\pi jf[t(\sigma_i,\phi_i)-t(\sigma_j,\phi_j)])L(\sigma_i,\phi_i,f)/L(\sigma_j,\phi_j,f)$ " and insert - - $L_{i/j}=\exp(2\pi jf[t(\theta_i,\varphi_i)-t(\theta_j,\varphi_j)])\underline{L}(\theta_i,\varphi_i,f)/\underline{L}(\theta_j,\varphi_j,f)$ - -, therefor.

In column 14, line 11, in Claim 7, delete "of set" and insert - - set of - -, therefor.

In column 14, line 36, in Claim 8, delete " $g_i(\theta_p,\Phi_p)$ " and insert - - $g_i(\theta_p,\Phi_p)$ - -, therefor.

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In column 14, line 59, in Claim 12, delete "$g_i(\theta_p, \Phi_p, f)$" and insert - - $g_i(\theta_p, \phi_p)$ - -, therefor.

In column 14, line 65, in Claim 14, after "$\Delta\underline{L}$" insert - - , - -.

In column 15, line 12, in Claim 18, after "Y_R," insert - - and - -.

In column 15, line 15, in Claim 18, delete "left-and" and insert - - left- and - -, therefor.

In column 16, line 3, in Claim 21, after "including" insert - - performing - -.

In column 16, line 21 (Approx.), in Claim 26, delete "claims 22 or 23" and insert - - claim 22 - -, therefor.

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$W(\sigma,\Phi)=1$
$X(\sigma,\Phi)=\cos(\Phi)\cos(\sigma)$
$Y(\sigma,\Phi)=\cos(\Phi)\sin(\sigma)$
$Z(\sigma,\Phi)=\sin(\Phi)$
where σ and Φ denote respectively the azimuth and elevation angles of the sound source with respect to the listener, expressed in radians. An advantage of this technique over the discrete panning method is that B Format encoding does not require knowledge of the loudspeaker layout, which is taken into account in the design of the decoder. A second advantage is that a real-world B-Format recording can be produced with practical microphone technology, known as the `Soundfield Microphone` [Farrah79]. As illustrated in FIG. 2, this allows for combining microphone-encoded sounds with electronically encoded sounds to produce a single B-format recording. First-order Ambisonic decoders do not reconstruct the acoustic pressure information at the ears of the listener except at low frequencies (below about 700 Hz). As described e.g. in [Bamford95], the frequency range can be extended by increasing the order of spherical harmonics, but only at the expense of a higher number of encoding channels and loudspeakers." and insert the same on Col. 1, Line 30, below "mixing stage." as a new paragraph.

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In column 7, line 10, delete "$H(f)=\exp(j\Phi(f))H_{min}(f)$" and insert - - $H(f) = \exp(j\psi(f)) H_{min}(f)$ - -, therefor.

In column 7, line 12 (Approx.), delete "$\Phi(f)$," and insert - - $\psi(f)$, - -, therefor.

In column 7, line 14 (Approx.), delete "$\Phi(f)$," and insert - - $\psi(f)$, - -, therefor.

In column 7, line 17 (Approx.), delete "Φ_R" and insert - - ψ_R - -, therefor.

In column 7, line 17 (Approx.), delete "Φ_L" and insert - - ψ_L - -, therefor.

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In column 7, line 59 (Approx.), delete "$\Phi_R(\sigma,\Phi,f)-\Phi_L(\sigma,\Phi,f)\approx\Phi(\sigma,\Phi,f)$" and insert - - $\psi_R(\theta, \varphi, f) - \psi_L(\theta, \varphi, f) \cong \psi(\theta, \varphi, f)$ - -, therefor.

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In column 8, line 5 (Approx.), delete "$\sigma_p, f)$ and $R(\sigma_p, \sigma_p, f)$" and insert - - $\varphi_p, f)$ and $R(\theta_p, \varphi_p, f)$ - -, therefor.

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In column 9, line 64 (Approx.), delete "$<g_i, g_k> = 1/(4\pi) \int \sigma \int \sigma g_i(\sigma,\phi) g_k(\sigma,\phi) \cos(\phi) d\sigma d\phi$" and insert - - $<g_i, g_k> = 1/(4\pi) \int_6 \int_\varphi g_i(6, \varphi) g_k(6, \varphi) \cos(\varphi) d6 \, d\varphi$ - -, therefor.

In column 12, line 21, delete "$g_i(\sigma, \phi)$" and insert - - $g_1(6, \varphi)$ - -, therefor.

In column 12, line 25, delete "σ_i, ϕ_i" and insert - - $6_i, \varphi_i$ - -, therefor.

In column 12, lines 25–26, delete "σ_i, ϕ_i" and insert - - $6_i, \varphi_i$ - -, therefor.

In column 12, line 40, delete "L_{ij}" and insert - - $L_{i/j}$ - -, therefor.

In column 12, line 41, delete "$L_{ij} = L(\sigma_i, \phi_i, f)/L(\sigma_j, \phi_j, f)$;" and insert - - $L_{i/j} = L(6_i, \varphi_i, f) / L(6_j, \varphi_j, f)$; - -, therefor.

In column 12, line 42 (Approx.), delete "L_{ij}" and insert - - $L_{i/j}$ - -, therefor.

In column 12, line 46 (Approx.), delete "$L_{ij} = \exp(2\pi j f[t(\sigma_i,\phi_i) - t(\sigma_j,\phi_j)]) L(\sigma_i,\phi_i,f)/L(\sigma_j,\phi_j,f)$." and insert - - $L_{ij} = \exp(2\pi j f[t(6_i, \varphi_i) - t(6_j, \varphi_j)]) L(6_i, \varphi_i, f) / L(6_j, \varphi_j, f)$. - -, therefor.

In column 14, line 11, in Claim 7, delete "of set" and insert - - set of - -, therefor.

In column 14, line 36, in Claim 8, delete "$g_i(\theta_p, \phi_p)$" and insert - - $g_i(\theta_p, \phi_p)$ - -, therefor.

AUG 2

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In column 14, line 59, in Claim 12, delete "$g_i(\theta_p, \Phi_p, f)$" and insert - - $g_i(\theta_p, \phi_p)$ - -, therefor.

In column 14, line 65, in Claim 14, after "$\Delta \underline{L}$" insert - - , - -.

In column 15, line 12, in Claim 18, after "Y_R," insert - - and - -.

In column 15, line 15, in Claim 18, delete "left-and" and insert - - left- and - -, therefor.

In column 16, line 3, in Claim 21, after "including" insert - - performing - -.

In column 16, line 21 (Approx.), in Claim 26, delete "claims 22 or 23" and insert - - claim 22 - -, therefor.